



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,046	03/11/2004	Jung-hyun Lee	030681-634	4688
21839	7590	10/22/2008	EXAMINER	
BUCHANAN, INGERSOLL & ROONEY PC			NADAV, ORI	
POST OFFICE BOX 1404			ART UNIT	PAPER NUMBER
ALEXANDRIA, VA 22313-1404			2811	
NOTIFICATION DATE		DELIVERY MODE		
10/22/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/797,046	<b>Applicant(s)</b> LEE ET AL.
	<b>Examiner</b> Ori Nadav	<b>Art Unit</b> 2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 15 July 2008.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 22 and 23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 22 and 23 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/DS/06)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____   | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (6,844,604), Yeo et al. (6,936,881) or Conley Jr. et al., all in view of Chang et al. (3,996,021) and Seidl et al. (2002/0014647).

Lee et al. teach in figure 1 and related text a capacitor of a semiconductor device (column 2, lines 66-67), the capacitor comprising:

a lower electrode;  
an AlO( $\text{Al}_x\text{O}_y$ ) film formed on the lower electrode;  
an upper electrode formed on the AlO film; and  
a dielectric film having a dielectric constant that is higher than that of the AlO film between the upper electrode and the AlO layer,

wherein the dielectric film is an HfO<sub>2</sub> layer, a ZrO<sub>2</sub>, or an STO layer (column 2, lines 66-67).

Yeo et al. teach in figure 4 and related text a capacitor of a semiconductor device, the capacitor comprising:

a lower electrode;

an AlO( $\text{Al}_x\text{O}_y$ ) film formed on the lower electrode;  
an upper electrode formed on the AlO film; and  
a dielectric film having a dielectric constant that is higher than that of the AlO film between the upper electrode and the AlO layer,

wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (column 9, lines 18-22).

Conley, Jr. et al. teach in figure 5d and related text a capacitor of a semiconductor device, the capacitor comprising:

a lower electrode;  
an AlO( $\text{Al}_x\text{O}_y$ ) film formed on the lower electrode;  
an upper electrode formed on the AlO film; and  
a dielectric film having a dielectric constant that is higher than that of the AlO film between the upper electrode and the AlO layer,

wherein the dielectric film is an  $\text{HfO}_2$  layer, a  $\text{ZrO}_2$ , or an STO layer (abstract).  
Lee et al., Yeo et al. and Conley, Jr. et al. do not teach using an AHO( $(\text{Al}_x\text{Hf}_{1-x})\text{O}_y$ ) film.  
Chang et al. teach using an AHO( $(\text{Al}_x\text{Hf}_{1-x})\text{O}_y$ ) film instead of AlO film (column 6, lines 33-50).

Seidl et al. teach in figure 1 and related text a capacitor comprising a lower electrode, an AHO( $(\text{Al}_x\text{Hf}_{1-x})\text{O}_y$ ) film formed on the lower electrode, and an upper electrode formed on the AHO film.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the AlO film in Lee et al., Yeo et al. and Conley, Jr. et

al.'s device with an AHO((Al<sub>x</sub>Hf<sub>1-x</sub>)O<sub>y</sub>) film in order to improve the device characteristics. The combination is motivated by the teachings of Chang et al. who point out the advantages of using an AHO((Al<sub>x</sub>,Hf<sub>1-x</sub>)O<sub>y</sub>) film instead of AlO film (column 6, lines 33-50).

Note that substitution of materials is not patentable even when the substitution is new and useful. Safetran Systems Corp. v. Federal Sign & Signal Corp. (DC NIII, 1981) 215 USPQ 979.

Regarding the claimed imitations of lower and upper electrodes, these features are inherent in Lee et al.'s device, because a capacitor must include lower and upper electrodes. Seidl et al. is also cited to teach a capacitor comprising a lower electrode and an upper electrode.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Yeo et al. or Conley Jr. et al., and Chang et al. and Seidl et al., as applied to claim 22 above, and further in view of Chooi et al. (6,486,080). (Lee et al., Yeo et al. or Conley Jr. et al.), and Chang et al. and Seidl et al. teach substantially the entire claimed structure, as applied to claim 22 above, except an oxidation barrier film formed between the lower electrode and the AHO layer. Chooi et al. teach an oxidation barrier film formed between the lower electrode and the AHO layer (column 2, lines 16-20).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an oxidation barrier film formed between the lower electrode and the AHO layer in prior art's device, in order to improve the device characteristics, .

***Response to Arguments***

Applicant argues that there is no motivation to combine Lee et al., Yeo et al. AND Conley Jr. et al.

The examiner does not combine Lee et al., Yeo et al. AND Conley Jr. et al. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (6,844,604), Yeo et al. (6,936,881) OR Conley Jr. et al., all in view of Chang et al. (3,996,021) and Seidl et al. (2002/0014647). That is, each of all the references to Lee et al. Yeo et al. and Conley Jr. et al., is in view of Chang et al. and Seidl et al.

Applicant argues "that the field of art in which Chang is classified is different from the field of art in which Seidl, Lee, Yeo, and Conley are classified", and thus "Chang, Seidl, Lee, Yeo, and Conley cannot be appropriately combined with another as they relate to different fields of endeavor".

Chang et al. is cited to teach an artisan the advantages of using an AHO((Al<sub>x</sub>Hf<sub>1-x</sub>)O<sub>y</sub>) film instead of AlO film. The fact that the Chang et al. reference is classified in a different class from that of Seidl, Lee, Yeo, and Conley, will not prevent an artisan from

understanding and accepting the advantages of the AHO( $(Al_x, Hf_{1-x})O_y$ ) film, and to apply said advantages to the devices of Seidl, Lee, Yeo, and Conley.

Applicant argues that Chang, Seidl, Lee, Yeo, and Conley are combined together "using hindsight after reviewing the presently pending claims", and the examiner "seems to be picking and choosing various features of Chang, Seidl, Lee, Yeo, and Conley to obtain the presently recited claims".

Lee et al., Yeo et al. and Conley, Jr. et al. teach substantially the entire claimed structure, except using an AHO( $(Al_x, Hf_{1-x})O_y$ ) film. Chang et al. and Seidl et al. are cited as teaching an AHO( $(Al_x, Hf_{1-x})O_y$ ) film. It is unclear how the examiner "picking and choosing various features of Chang, Seidl, Lee, Yeo, and Conley to obtain the presently recited claims".

Applicant argues that "the dielectric layer structure obtained by such replacement is different from the dielectric layer structure presently recited".

Applicant does not explain why and in what way the dielectric structure of prior art's device is different from the claimed dielectric layer structure.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

O.N.  
10/22/2008

/ORI NADAV//  
PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800